Michigan. Bureau of Maternal and Child Health

MATERNAL MORTALITY SURVEY
Pontiac, Michigan
1935 - 1939

DEC 22 1960

The Maternal Health Committee of the Oakland County Medical Society requested the Bureau of Maternal and Child Health of the Michigan Department of Health to conduct a fact-finding survey of maternal mortality. This request was made in the late spring of 1940. The survey was begun July 1, 1940. The analysis of all pertinent maternal mortality and morbidity data was confined to that obtainable of and between the five year period 1935 to 1939.

In this five year interim, 1935 to 1939, there were 9125 deliveries resultant in the births of 8826 live infants and 299 stillbirths. Eighty-one (81) mothers died during this period of time. Two mothers of this group died of diseases coincidental with pregnancy. Thus 79 maternal deaths are recorded having, as their cause of death, direct complications of obstetrics. The distribution of maternal deaths, by years of the study, are illustrated in chart one.

Chart One

Births and Maternal Mortality*
Pontiac, Michigan
1935 - 1939

Year	Total Births	Live Births	Stillbirths	Maternal Deaths	Maternal Mortality per 1000 live births Pontiac	State
1935	1518	1462	56	13	8.8	5.01
1936	1573	1520	53	18	11.8	4.80
1937	1942	1887	55	16	8.5	3.56
1938	2016	1936	80	16	8.2	3.56
1939	2076	2021	55	16	7.9	2.96
Total 5 yrs.	9125	8826	299	79	8.95	3.49

*Maternal mortality rate before allocation to residence. These rates are based upon the total number of live births and maternal deaths actually occurring within the city of Pontiac, Michigan.

In this half decade, 1935 to 1939, 553 infants died under the age of one year. Nearly two thirds of this number (362 or 65.5%) expired under the age of 30 days! It is of paramount obstetrical interest to observe that 184 (nearly 51%) of the 362 neonatal deaths happened to newborn infants under the age of one day.

HB
1323.M6
M624m
1942
c.1
NATIONAL LIBRARY OF MEDICINE
WASHINGTON, D. C.

The 1930 population for the city of Pontiac, Michigan, was 64,928. The advised estimate of 66,000 population within the corporate limits of the city will be used as a base figure in this study.

Two hospitals, with a total capacity of 287 beds, serve Pontiac. The preponderant number of obstetrical cases, institutionalized for deliveries, utilize the obstetrical services of these hospitals. These two hospitals have available a total of 45 bassinets. In the period of this study three maternity homes cared for a small fraction of these obstetric cases. Contrary to recommendations and altruistic suggestions two of these maternity homes persist in advertising themselves as "hospitals". Further data pertinent to these so-called "maternity hospitals" will be subsequently considered in this report.

The American Medical Association Directory, 1938 edition, lists 91 doctors residing in Pontiac, Michigan. The same directory indicates that 8 physicians of this group favor obstetrics or obstetrics and gynecology to the extent that they consider theselves as limiting their medical practice entirely or partially to these specialty fields. The Directory of the American Specialists, 1939 edition, lists but one doctor in Pontiac as a recipient of certification from the American Board of Obstetrics and Gynecology. In the past one year one additional Pontiac physician acquired similar specialty certification.

The uncorrected birth rate for the city of Pontiac, Michigan, during this five year period was 13.3 per 1000 while the actual residental birth rate was 11.2 per 1000 population. The maternal mortality rate, prior to allocation of the non-residental maternal deaths, was 8.95 per 1000 live births. (See chart one). To ascertain the complete urban obstetrical status of a city one must consider all deliveries within the corporate limits first, and in subsequent analysis determine other contributing factors, viz. non-residence, visiting doctors, ante natal care, etc.

A comparison of the unallocated maternal mortality rate, each year, between the city of Pontiac and the state of Michigan is strikingly illustrated in chart one. One will note the steady decline of maternal deaths, both by number and maternal mortality rate, in the state in contrast to the almost unchanging and stationary maternal death rate for the city of Pontiac. These facts suggest that the activities necessary to the decline of maternal mortality in Pontiac are neither improving nor rising but unfortunately, for the mothers in Pontiac, remaining at a most persistent level. This level, on the basis of other cities' experience, will so remain unless the obstetricians, hospitals, and newer generation of doctors determine to correct those present untoward factors inducing maternal deaths.

A cursory examination of the city of Pontiac, Michigan, and the Michigan Department of Health statistics, relative to maternal and infant mortality will show an apparent discrepancy between the two sets of figures as discussed in this survey. The data within this survey will obviously yield higher mortality rates and percentages as the statistics of both the city and state are based entirely upon death certificate diagnoses while the figures used in this study were determined after securing additional evidence. This evidence was obtained by reviewing, on two occasions, all death certificates of females dying in Pontiac, Michigan, who were in the child-bearing ages, 15 to 50. Additional evidence was obtained by checking the names of the suspected maternal deaths against similar names and addresses on the city birth certificates. These additional suspected cases were noted separately and, wherein deaths occurred in hospitals, each individual case record was studied in detail.

A comparison of the maternal mortality rates of eleven Michigan cities is presented in chart two. Pontiac ranks eleventh, and last in this group. In other words, there are 10 other cities within the state of Michigan where it is safer for the mother herself to have her baby.

Chart Two

The Comparative Maternal Rates* of Eleven Michigan Cities
1935 - 1939

City	Five Year Maternal Mortality Rate	Ranking	City	Five Year Maternal Mortality Rate	Ranking
Bay City	2.66	1	Jackson	4.11	7
Grand Rapids	3.09	2	Detroit	4.25	8
Lansing	3.60	3	Battle Creek	4.55	9
Kalamazoo	3.71	4	Flint	5.18	10
Muskegon	3.79	5	Pontiac	5.58	11
Saginaw	3.80	6			

*The gross figures for the calculation of these rates were obtained from the five annual reports of the Michigan Department of Health.

One can express the unenviable situation of the maternal status, for this five year period, in the following harsh although accurate statement: Pontiac, of eleven Michigan cities, was the most hazardous and dangerous locale for any mother, about to have a baby, in the urban section of Michigan!

The figures used in chart two to determine the computation of the maternal death rate of 5.58 per 1000 live births, in Pontiac, were based entirely upon completely allocated statistics obtained at the State Bureau of Vital Statistics. This figure included only the 37 resident maternal deaths when actually there were in the unallocated figures, 79 deaths from maternal complications in Pontiac during this five year period. Hence Pontiac in comparison to the other larger Michigan cities' unallocated statistics would occupy an even deeper cellar ranking by a still greater substantial margin were it possible to obtain comparative information from the other cities.

The five year maternal mortality rate for the entire state of Michigan in this comparative interval was 3.49 per 1000 live births. The maternal mortality rate of Pontiac, Michigan, was therefore 60% greater than that of the state of Michigan as a whole during the same half decade. Pontiac's maternal mortality rate is more than double that of Bay City which enjoys the number one ranking for the lowest five year Michigan urban maternal mortality rate.

Allocation of Maternal Deaths

The number of births, infant and maternal deaths can be allocated to place of patient's residence; institution of delivery; time duration of the antepartum period of the deceased mother as well as to various other factors of etiology, time, and treatment. This procedure of allocation is of definite value for it indicates trends in treatment, type of institutional care, and other qualities influencing mortality. The correction of the unfavorable trends, wherein amenable to correction, does promote constructive readjustment in obstetrical judgment and thereby does tend to conserve maternal lives!

Allocation by Residence

Chart three illustrates the apportionment of births and maternal deaths by residence. In the five year interval of this study 2731 mothers (29.7% of the total deliveries in Pontiac) from neighboring subdivisions or villages utilized the facilities of the hospitals of Pontiac for their delivery or postpartum care.

There has been a steady downhill tendency in the percentage of resident deliveries in Pontiac, from 79.3% in 1935 of resident cases to 61.7% in 1939. (See chart three.) Corollary to this is a comparative, although less well marked, upward trend in the percentage of non-resident patients having their babies in Pontiac, from 30.7% in 1935 to 38.7% in 1939. Eighteen per cent less resident mothers of Pontiac were delivered in Pontiac in 1939 than in 1935 while only 8% more non-resident mothers came to Pontiac to have their babies.

The above facts may be partly explained on the decrease in city birth rate but more probably upon the trend of small home owners to move to neighboring suburbs and villages. From these areas they commute daily to occupations in the city in the hope of securing less crowded urban conditions and possibly to effect a savings in their living expenses by raising gardens, chickens, and other essentials of maintenance.

Chart Three

Births and Maternal Deaths
(Allocated by Residence)
Pontiac, Michigan
1935 - 1939

Year	Resident				Non-Resident				All Pontiac Deliveries		
	Number Births	Per cent	Maternal Mortality		Number Births	Per cent	Maternal Mortality		Number Births	Maternal Mort.	
			Number Deaths	Rate			Number Deaths	Rate		Number Deaths	Rate
1935	1205	79.3	4	3.4	313	30.7	9	31.0	1518	13	8.8
1936	1175	74.7	9	7.8	398	25.3	9	24.1	1573	18	11.8
1937	1376	70.8	10	7.4	566	29.2	6	11.1	1942	16	8.5
1938	1356	67.7	8	6.0	660	32.8	8	12.9	2016	16	8.2
1939	1282	61.7	8	6.2	794	38.3	8	10.5	2076	16	7.9
5 yr. Total	7394	70.3	39	5.3	2731	29.7	40	15.4	9125	79	8.95

Further perusal of chart three reveals that the non-resident maternal mortality (15.4/ 1000 L.B.) is approximately three times greater than the resident maternal mortality (5.3/ 1000 L.B.) This is to be expected. The Pontiac hospitals are havens for neighboring non-resident women presenting themselves with more serious complications of pregnancy, delivery, and postpartum care. Nevertheless, further study of the non-resident maternal mortality rate column depicts a striking decrease in mortality rates of non-resident patients. In 1935 the non-resident maternal mortality rate was 31.0 per 1000 live births, one mother in every 32 admitted non-resident mothers while in 1939 the non-resident maternal mortality rate was 10.5 per 1000 live births, one mother in every 96 admitted non-resident mothers. In brief, the chances of a non-resident mother surviving an obstetrical complication were three times better in 1939 than in 1935.

Opposed to the above findings one sees that the chances of a resident mother losing her life remains virtually unchanged in any of the five years.

Part of the explanation of the decreasing non-resident maternal rate makes this striking change appear fallacious. More mothers of non-resident group were delivered each succeeding year.

None the less the percentage of increase in number of deliveries as opposed to maternal mortality rates, in the non-resident group, does not entirely explain this decrease. It is the conviction of the statistician that other factors, such as increased public knowledge concerning pregnancy complications and earlier ante-partum care of patients, would indicate a gradual trend for the more conservative management of complications.

In all likelihood, were it possible to exclude those maternal deaths resultant from operative delivery or the accouchement force management of maternal complications, the ratio of comparison between resident and non-resident maternal death rates would reach a similar maternal mortality quotient.

Allocation by Institution of Delivery

The determination of percentage of deliveries, maternal deaths, and number of deliveries for each institution in the city of Pontiac is illustrated in chart four.

Chart Four

Maternal Mortality Survey
Pontiac, Michigan
1935 - 1939
Allocation by Institution of Delivery

Institution	Number of Deliveries	Number of Maternal Deaths	Maternal Death Rate /1000 Live Births	Percentage of Deliveries in the city	Percentage of Maternal Deaths in the city
Hospital A	2023	* 42	21.8	22.2%	53.2%
Hospital B	3730	35	9.4	40.9%	43.0%
Home	3065	* 4	1.01	33.6%	3.8%
Maternity Homes	216	0		2.4%	0
Osteopaths	90	0		.9%	0
Midwives	1	0			0
TOTALS	9125	**81	8.95	100%	100%

*Each figure contains one maternal death due to incidental disease associated with pregnancy.

**The two maternal deaths due to disease incidental to pregnancy are not included in the determination of mortality or percentage rates.

Hospital A, delivering but 22.2% of the pregnant women has the misfortune to be the site where 53.2% of the maternal deaths occurred. The maternal mortality rate for this institution is more than double that of the other hospital in the city in which nearly two thirds (64.8%) of all hospital deliveries occurred. Hospital A had a maternal mortality rate approximately twenty times greater than home deliveries wherein the number of deliveries was nearly twice that of the former.

It is of interest to note that the osteopaths delivered but 90 patients in this five year interim. Only one midwife delivery occurred during this period of study. One maternal patient died, undelivered of a seven-months pregnancy, of labar pneumonia in hospital A while another 28 year old patient died, at home, 43 days postpartum, of a diffuse carcinoma of the stomach following a premature delivery at hospital B. These two cases were not included in the determination of mortality or percentage rates.

Hospital A's 42 maternal deaths were divided into 22 resident maternal deaths and 20 non-resident maternal deaths. Hospital B had 14 resident maternal deaths and 21 non-resident maternal deaths. Hence residency as an allocative procedure of the two institutions for hospital delivery appears to bear little significance in this analysis. The proportionate percentage of deliveries in the resident and non-resident group is nearly the same in the two hospitals although the actual numbers may appear larger for hospital B.

Allocation of Maternal Deaths Based on Age of Fetus

A more judicious analysis of the maternal deaths is obtained when those maternal fatalities less than seven months pregnant are deducted from the total number of maternal deaths. See chart five.

Chart Five

Maternal Mortality Survey
Pontiac, Michigan
1935 - 1939
Allocation of Maternal Deaths on Age of Fetus

Institution		No. Maternal Deaths with fetus less than 7 months	No. of Maternal Deaths with fetus more than 7 months
Hospital A	Resident	13	8
	Non-Resident	10	10
Hospital B	Resident	2	*13
	Non-Resident	3	19
Home	Resident	0	* 3
All Pontiac Figures	Resident	15	24
	Non-Resident	13	29
Grand Totals		28 (35.5%)	**53 (64.5%)

*Includes case which died of disease incidental to pregnancy
**Includes 2 maternal deaths from diseases coincidental to pregnancy. Not included in per cent estimates

Hospital A figures disclose that 23 mothers, who were less than seven months pregnant, died within its walls during this five year period. Hospital B, during the same time, lost five mothers who were less than seven months pregnant. Actually, if hospital A's abortion deaths were removed from this group of 23 maternal deaths its total maternal rate would have been lower than its sister hospital. Therefore, these statistics would indicate that improvement evinced by a decreasing maternal mortality rate could be secured by that hospital devoting more of its attention to the meticulous care of its abortion cases! Hospital B would similarly benefit by closer attention to its preoperative indications in those obstetrical cases requiring operative interference.

The Cause of Maternal Death in Pontiac

The principal causes of maternal death in Pontiac during this study period are listed in chart six. Infection leads all other causes and was responsible for nearly 50% of the total maternal deaths.

Chart Six

Principal Causes of Maternal Death
Maternal Mortality Survey
Pontiac, Michigan
1935 - 1939

	Number	Percentage
Infection	38	46.9%
Hemorrhage	21	25.9%
Toxemias	16	19.7%
Embolism	4	5.0%
Other Causes	2	2.5%
Total	81	100%

Hemorrhage as a general group was responsible for the second largest percentage of maternal deaths (25.9%) while toxemias contributed nearly one-fifth of the maternal mortality.

The principal causes of death are further sub-divided into more specific etiological factors in chart seven.

Thirty-eight mothers died as the result of infection in their puerperium and of this group infected abortions contributed 21 deceased mothers. Infected abortion contributed fifty-five per cent (55.3%) to the total infection group while postoperative infections added nearly another quarter (23.7%) to the total group. Puerperal sepsis accounted for the remaining 21% of the infection group.

Chart Seven

Principal Causes of Maternal Death
Maternal Mortality Survey
Pontiac, Michigan
1935 - 1939

Infection		
Septic Abortions	21	55.3%
Postoperative Peritonitis	9	23.7%
Puerperal Sepsis	8	21.0%
Total	38	100%
Toxemias		
Eclampsia	9	56.3%
Pre-eclampsia	3	18.8%
Nephritic Toxemia	3	18.8%
Pernicious Vomiting	1	6.1%
Total	16	100%
Hemorrhage		
Postpartum	8	38.1%
Postoperative Shock	8	38.1%
Placenta Previa	2	9.5%
Ruptured Uterus	2	9.5%
Forceps Tears	1	4.8%
Total	21	100%
Other Causes of Death		
Embolism	4	66.7%
Pneumonia	1	16.7%
Carcinoma Stomach	1	16.6%
Total	6	100%

Fourteen of the twenty-one septic abortion cases, or two-thirds, died of sepsis following medical treatment. The preponderant majority in this group entered the hospitals in a terminal septic condition. One patient in this group died of septic abortion in her home. Fifteen septic abortions died in hospital A while the remaining five patients died in hospital B.

Six of the eight cases of puerperal sepsis were delivered in their homes and subsequently entered the hospitals only when their conditions warranted more extensive treatment. Two cases of puerperal sepsis following delivery in the hospital, one in each of the two hospitals. In each of the latter two cases the labor was forced by minor surgical inductions based upon the indication that both patients were "overdue"!

Two thirds (six of the nine) of the patients succumbing to postoperative peritonitis died of it following previous cesarean sections. It was pathetic to observe that all of this group were operated upon by a single operator. Peritonitis followed perforation of the uterus; a unilateral salpingo-oophorectomy for an associated right ovarian tumor with a four months pregnancy, and manual removal of a retained (for 34 minutes) placenta respectively in each of the remaining three cases.

Further mention of cesarean section will be made in a companion paper to this study. The brief mention of sections in this particular paper is therefore not an omission of this important aspect, rather, the status of cesarean section in the city of Pontiac was deemed of such vast importance to the members of the Oakland County Medical Society's Committee on Maternal Health that a complete survey of this particular procedure was performed as a separate study for the concomittant period of time of the mortality analysis.

Fatal postpartum hemorrhage occurred in eight patients, 38.1% of the hemorrhage group! Four of these deaths followed accoucehment force in the procedure of early versions with extractions; two deaths followed forceps delivery and the other two fatal postpartum hemorrhages followed atonic uteri which developed after normal spontaneous deliveries.

Postoperative shock occurred in eight patients following cesarean section. Seven of this group were operated on by the same obstetric operator mentioned in a preceding paragraph. Two placenta previa deaths followed cesarean section while those dying from ruptured uteri and its attendant hemorrhage following cesarean section and perforation of the uterus. In the latter case the patient died following perforation of the uterus after a curettement was done as a therapeutic abortion measure. High forceps application, resulting in extensive cervical lacerations with a fatal hemorrhage, concludes the list of deaths in the hemorrhage group.

Nine (56.3%) of the toxemia deaths followed eclampsia. Four of this group were treated by medical means. Three of the four eclamptics were sectioned in their intramortem period and one live baby was obtained. One eclamptic patient died following bougie induction.

Two of the pre-eclamptic cases died following cesarean section while the third succumbed after a surgical induction of labor. Two of the three nephritic toxemia patients died following surgical induction of labor while the third was subjected to an intramortem cesarean section. One patient died following hysterectomy done upon the indication of pernicious vomiting of pregnancy.

Four cases died the eighth day, or later, of embolism. Two of these deaths occurred in hospital A, one in hospital B, and the other in her home. Three of this group had had normal spontaneous deliveries while the fourth gave a history of induced labor for the indication of "post-term pregnancy".

In the total group of 81 maternal deaths the analysis indicates that 22 patients died following cesarean section; 6 after curettements; 7 following accouchement force procedures; 4 after surgical inductions; 2 after uterine perforations; and 2 succeeding laparotomy. In short, 43 of the 81 fatal obstetric cases followed some operative obstetrical procedure. If this operative incidence of 53% could have been decreased by the avoidance of surgical procedures in favor of more conservative, although more difficult, medical treatments the number of maternal deaths undoubtedly would have been less.

The Progeny

There were 28 fatal pregnancies whose antepartum period was less than seven months. The progeny of these fatal 81 maternal death cases which were in the viable age group, over seven months, numbered 59.

There were three sets of twins in this group, one set fell into the previable group while the remaining two sets, all of whom died, could be listed as in the viable age group although both sets of twins were born prematurely.

Chart Eight

Maternal Mortality Survey
Pontiac, Michigan
1935 - 1939

The Progeny

Group	1935	1936	1937	1938	1939	Total five years
Previable age (Under 7 mos.)	3	9	5	5	6	28
Viable age group (Over 7 mos.)						
Stillborn	5	2	3	3	2	15
Died	2	4	4	1	1	12
Lived	5	6	6	8	5	30
Undelivered	0	0	0	1	1	2
Total viable age	12	12	13	13	9	59
Grand Totals	15	21	18	18	15	87

In chart eight it can be seen that 15 of the 59 viable age infants were stillborn, a percentage of 25.5%. Twelve of the viable age infants born alive died in the neonatal period of one month following their delivery. Two infants of viable age died undelivered.

A summary discloses that but 30 infants survived, 50.8% of the viable age group, to permit their discharge alive from the neonatal period. Twenty-one boys and nine girls survived the neonatal period.

Age and Status of the Maternal Group

The youngest patient in this group of 81 maternal deaths was 15 and the eldest was 47. Chart nine discloses the age distribution of the fatal resident and non-resident maternal cases.

Chart Nine

Age	Resident	Non-Resident	Total
15-19	4	7	11
20-25	9	10	19
26-29	9	7	16
30-34	8	9	17
35-39	6	5	11
40-45	3	3	6
45-50	1	0	1
Totals	40	41	81

Three of the deceased mothers were single and illegitimately pregnant. One widow and one divorcee were exceptions to the total remaining group of 76 married women.

Parity of the Group

There were 30 primiparas and 43 multiparas. It was impossible to secure information concerning parity in 8 of the cases. The correlation of parity with age distribution of those cases of known parity is shown in chart ten.

Chart Ten

Maternal Mortality Survey
Pontiac, Michigan
1935 - 1939

Age-Parity Correlation

Age	Parity								
	0	1	2	3	4	5	6	7	8 or over
15-25	21	5	2	0	0	1	0	0	0
26-34	6	2	9	2	2	1	0	1	4
35-44	2	1	3	3	3	0	2	1	0
45 and over	0	0	0	0	0	1	0	0	0
Totals	30	8	14	5	5	3	2	2	4

Unknown parity, 8

Only 5 abortions were present in the primipara group. Toxemia was present as a cause of death in 6 primiparas; hemorrhage in 8 primiparas, and embolism in 2 other primiparas.

The Doctors Doing Obstetrics in Pontiac, Michigan

There were, according to the American Medical Association Directory, 1938 edition, 91 doctors in the city of Pontiac, Michigan. Forty-two of these doctors were licensed to practice medicine in Michigan prior to 1920, while the remaining 49 doctors were licensed after 1920. This same directory indicates that 8 doctors of the 91 in the total group preferred the practice of obstetrics (3) or obstetrics and gynecology (5). In this group of 8 men, 2 were licensed in 1905 or before; 4 men were licensed in 1915 or before; while 5 were certified in 1920 or before. None of this group were licensed after 1927.

There was but one delivery recorded by a midwife in this half decade of 1935 - 1939. Five osteopaths delivered a total of 90 mothers and of these but one man averaged more than 10 deliveries per annum.

In the group of 91 Pontiac physicians a yearly average of 63 men performed obstetrics while a yearly average of 71 out-of-city doctors utilized Pontiac hospitals for their deliveries. In brief, approximately 133 different doctors practiced obstetrics within the corporate limits of Pontiac each year of this half decade.

It was possible, with the assistance of the meticulous and impeccable records compiled by the Pontiac Department of Public Health, to determine the exact number of deliveries for each doctor doing obstetrics each year of this study 1935 - 1939. With this invaluable assistance a fuller evaluation of doctor qualification can be statistically studied based on year of licensure, number of deliveries, and the number of maternal deaths.

With the above statistics available the doctors practicing obstetrics were grouped into groups based on the number of deliveries per each individual doctor per year. Chart eleven explains the legendary definition of each group. These groups could well be called the "quantity obstetrical experience" groups.

Chart Eleven

Maternal Mortality Survey
Pontiac, Michigan
1935 - 1939
Legend to Explain Definition of Each Group

Quantity Obstetrical Experience Groups

Group I	Each	M.D.	delivers	100 or more	cases	per	year
Group II	"	"	"	50 - 99	"	"	"
Group III	"	"	"	25 - 49	"	"	"
Group IV	"	"	"	1 - 24	"	"	"
Group V	"	"	"	1 - 10	"	"	"

On chart twelve we can see the number of physicians allocated to each of the quantity obstetrical experience groups for both Pontiac physicians and out-of-city doctors.

Chart Twelve

Maternal Mortality Survey
Pontiac, Michigan
1935 - 1939
Allocation of Doctors Doing Obstetrics to Obstetrical Experience Groups

Obstetrical Experience Groups	1935		1936		1937		1938		1939	
	Pontiac Doctors	Out of City	Pontiac Doctors	Out of City	Pontiac Doctors	Out of City	Pontiac Doctors	Out of City	Pontiac Doctors	Out of City
I	3	0	1	0	1	0	4	0	1	0
II	3	0	6	0	11	1	5	2	8	1
III	13	2	8	2	7	2	9	1	11	4
IV	23	34	28	36	32	38	34	38	28	38
V	12	31	11	31	16	34	22	31	18	29
	54	67	54	69	67	75	74	72	66	72

Average for five years: Pontiac doctors, 63; out-of-city doctors, 71.

It can be shown that 6 to 9 of the doctors in Pontiac see more than 50 individual cases each year while a considerable number of doctors seldom see more than 2 obstetric cases per month. The importance of experience in obstetrical skill is well illustrated by the maternal mortality rates of each of these obstetrical experience groups. See chart thirteen.

Maternal Mortality Survey
Pontiac, Michigan
1935 - 1939
Correlation of Doctor-Experience (on quantity basis) to Maternal Deaths

Doctors Obstetrical Experience	Year of Maternal Death 1935 No. M.D.s in group	1936 No. M.D.s	1937 No. M.D.s	1938 No. M.D.s	1939 No. M.D.s	Total five Years No. M.D.s
I	1	1	3	4	0	9
II	3	*6	4	5	4	22
III	5	2	3	4	3	17
IV	1	*6	2	1	6	16
V	3	5	4	2	3	17
Totals	13	20	16	16	16	81

*Each contain one doctor who attended a patient dying of disease incidental to pregnancy.

In the last column groups IV and V together lost 33 mothers or approximately 41% of the maternal deaths occurred in the hands of doctors who delivered less than 2 women per month and half of this number of fatal cases were under the supervision of doctors who delivered less than 10 babies per annum! It is obvious that the doctor who dabbles with obstetrics as but a small fraction of his practice is a source of danger to his pregnant patient.

A correlation of each doctor's quantitative obstetrical experience to the etiological factor in the cause of death of the fatal cases he had supervision of is well illustrated in the following chart fourteen.

Correlation of Doctor's Quantitative Obstetrical Experience
To Cause of Death of His Fatal Obstetric Cases

M.D. did	Group	Cause of Maternal Deaths Infection	Hemorrhage	Toxemia	Other Causes
100 or more dels. / year	I	2 (22%)	5 (55%)	1	1
50 to 99 " " "	II	12 (57%)	4 (19%)	3	2
25 to 49 " " "	III	10 (50%)	5 (25%)	2	3
1 to 24 " " "	IV	9 (56%)	2	5	0
1 to 10 " " "	V	5 (33%)	5 (33%)	5 (33%)	0
Totals		38	21	16	6

A glance at chart fourteen illustrates for example that those men doing 10 or less deliveries per year lost a total of 15 mothers, five each of infection, hemorrhage, and toxemia, as contrasted to a total of 9 mothers lost by those doctors who each deliver more than 100 mothers annually. Those doctors doing more deliveries experienced greater difficulty with hemorrhage than any other cause of maternal death. Doctors who did but 2 to 4 deliveries per month experienced in 60% of their cases greater difficulty with infection as a cause of maternal death. All groups, save those of group I, experience their greatest difficulty in the management of puerperal infection.

Among the eight Pontiac doctors listed by the American Medical Association, 1938 Directory, as specialists in obstetrics we find that the quantitative obstetrical experience of this small group varies considerably, e.g., in 1935 one doctor of these 8 physicians delivered more than 100 mothers; 2 men delivered 50 to 99 mothers; 3 delivered 24 to 49 cases while 2 physicians actually delivered less than 2 mothers per month. This same relative ratio was seen to hold for each of the annual periods surveyed in this paper. In contrast to this group of men the 2 men certified by the American Board of Obstetrics and Gynecology consistently fell among those delivering 100 or more mothers each year.

The Consultants

Consultation was sought and obtained in 13 of the fatal abortion cases; in none of the puerperal sepsis cases; in but 7 of those mothers dying from hemorrhage; and but 6 times in the series of toxemic patients. In a large majority consultation was obtained much too late.

Consultation was obtained in but 26 of the total of 81 mothers who died of complications of pregnancy or disease incidental to pregnancy.

The Records

In both hospitals in Pontiac the patient hospital records are discouraging to review. It was a sad commentary to observe that on numerous occasions the examiner was required to follow the clinical course of the patient via the nurses' notes even to ascertain medications, procedures, or evidence of progress notes. The operative notes were, for the most part, of a stereotyped nature. Cesarean sections were described in three to five sentences. Laboratory data was lacking in many records. Medical histories were notoriously deficient in both hospital records. Most physical examinations were cursory and negative.

Both hospitals show, however, attempts to improve their records for those of more recent date were more inclusive than those of earlier dates.

The maternal mortality statistics compiled cumulatively by the City Health Department were amazingly complete and adequate.

Maternity Homes in Pontiac

Three maternity homes supplied a haven for the delivery of 216 obstetrics patients in the period 1935 - 1939. But one of these "homes" ran consistently throughout this half decade. Two of the three maternity homes have wooden signs outside their structures which state they are "maternity hospitals". One of these maternity homes has the temerity to advertise its institution in the yellow classified advertisement section of the Pontiac telephone book as a "maternity hospital". Both of these maternity homes have been advised that the title "hospital", as related to obstetrical practice, is to be reserved for those institutions qualified to extend the fullest of medical care to all complications of pregnancy.

One maternity home has had but 15 deliveries within its walls and all of these labors were supervised by the same doctor who recommended licensing of this particular maternity home to the Social Welfare Department.

NATIONAL LIBRARY OF MEDICINE
WASHINGTON, D. C.

The modern technique for isolation of septic cases would be impossible in all three of these maternity homes. In the one home which has available a separately reserved room for septic cases the nursing help and other patients are required to use a communal bathroom for disposal of excreta, towels, etc.

The proprietress of one maternity home admits that she allows curettements and minor extra obstetrical surgical procedures to be done in her institution but is unable to furnish an operating room book. In another maternity home a large "tabby cat" apparently has full run of the institution as well as a minor child and an ailing elderly relative.

None of the maternity homes post visiting hours and the number of visitors permitted to see each postpartum patient is unrestricted. None of the maternity homes had, at the time of the examiner's visits, means to conduct a blood transfusion although one proprietress stated that one of her visiting staff plans to make her a gift of a suitable transfusion set. Were this possible there still is no evidence of a necessary microscope to permit cross-agglutination studies of the blood types.

It is difficult to conceive how one could possibly recommend any of the three maternity homes which were operating in Pontiac during the interim of this study.

Infant and Neonatal Mortality Rates

It was not the purpose of this survey to conduct an extensive analysis of the infant and neonatal mortality aspects. However, in the course of the analysis multiple data, beautifully collected and compiled by the Pontiac City Health Department, was presented to the writer. The more pertinent aspects of the data, as related to obstetrical mortality, is herewith included.

In chart fifteen the infant and neonatal mortality rates for the city of Pontiac, Michigan, for the half decade, 1935 to 1939, are given.

Chart Fifteen

Infant and Neonatal Mortality Rates
Pontiac, Michigan
1935 - 1939

Years	Total Births	Still-births	Live Births	Deaths under 1 year				Neonatal Deaths (under 1 month)				
				Male	Female	Total	Rate	Under 1 day	Under 1 wk.	Under 1 mo.	Total	Rate
1935	1518	56	1462	51	39	90	61.56	36	13	8	57	38.9
1936	1573	53	1520	52	33	85	55.92	24	18	7	49	32.2
1937	1942	55	1887	78	60	138	73.13	46	22	16	84	44.5
1938	2016	80	1936	74	55	129	66.62	35	21	30	86	44.4
1939	2076	55	2021	70	41	111	54.92	43	32	11	86	42.5
Five years	9125	299	8826	325	228	553	62.64	184	106	72	362	40.9

The infant mortality rate has shown a consistent fall during the last three years of this study although the fall in infant deaths has not occurred in the neonatal period. In brief, the neonatal death rate like that of the maternal mortality rate has remained virtually unchanged in the five year latitude of this study. Neonatal mortality rates will obviously decrease with a concommitant decrease in the maternal morbidity rate.

It is of obstetrical interest to list the causes of neonatal deaths, during this five year period, of those babies dying prior to the age of 1 day. See chart sixteen.

Chart Sixteen

Cause of Death (as on death certificates) in
Deaths Under Age of One Day
Pontiac, Michigan
1935 - 1939

Cause of Death	Number	
Prematurity	124	68%
Congenital Heart Disease	11	6%
Congenital Deficiency	10	6%
Intracranial Hemorrhage	9	5%
Atalectasis	9	5%
Abnormal Presentations	4	2.4%
Other causes	15	6.6%
	182	100%

Considerable control over premature birth rests with the obstetrician. Chart sixteen illustrates that 68% of the neonatal deaths under the age of 1 day were due to prematurity!

Stillbirths in Pontiac

Stillbirths occurred on 299 occasions during this five year period. Chart seventeen portrays the death certificate evaluation as to the various etiological factors.

Chart Seventeen

Stillbirths in Pontiac, Michigan
1935 - 1939
Some Obstetric Causes Listed as Producing Stillbirths

Unknown Etiology	142	Maternal Dystocia	3
Prematurity	37	Trauma to Mother	3
Monster	28	Pyelitis in Mother	2
Maternal toxemia	18	Cesarean section	2
Placenta Previa	15	Post-term	2
Cord twist or Prolapse	15	Band'l's Ring	2
Asphyxia pallida	11	Abnormal Positions	2
Abruptio placenta	4	Ruptured Uterus	1
Birth Injury	3	Other	5
Lues	4		
		Total	299

Twenty-seven of the stillborns were reported as macerated and of this group 22 cases were diagnosed "stillborn, cause unknown". A detailed study of the causes given for stillbirths will be of considerable interest to those interested in obstetrical care.

Recommendations

No recommendations will be made. This survey was designed entirely as a fact finding commission. It is with genuine feeling, however, that the writer ventures to hope that this survey will be accepted as the basis for discussion in any attempts to make constructive programs for obstetrical improvement in the city of Pontiac.

A companion analysis of all the cesarean sections in Pontiac, Michigan, during and between 1935 - 1939 will be presented subsequently to the Oakland County Medical Society.

Respectfully submitted,

Clair E. Folsome, M.S., M.D.
Consultant in Obstetrics
Bureau of Maternal and Child Health
Michigan Department of Health